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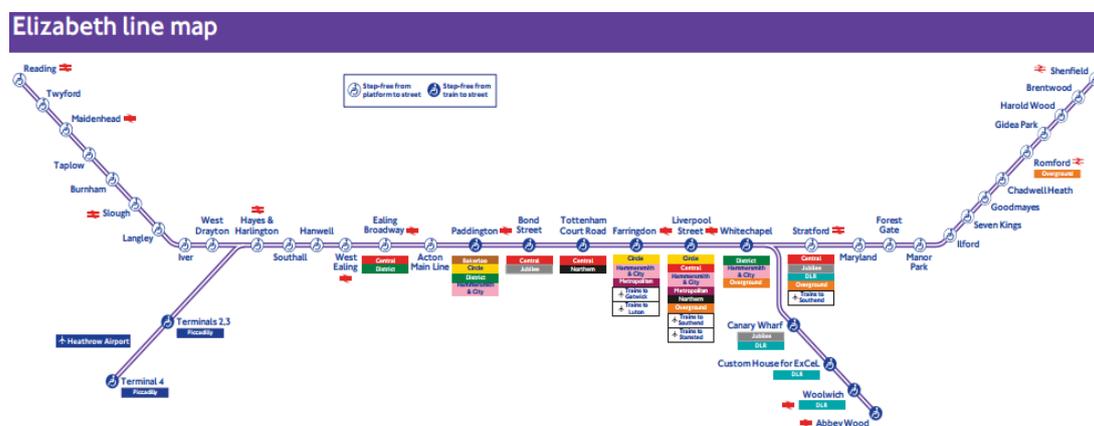
## Crossrail

Crossrail Limited is building a new railway for London and the South East, running from Reading and Heathrow in the west, through 42km of new tunnels under London to Shenfield and Abbey Wood in the east. The project is building 10 new stations and upgrading 30 more, while integrating new and existing infrastructure.

The £14.8 billion Crossrail project is currently Europe's largest infrastructure project. Construction began in 2009 at Canary Wharf, and is now almost 75% complete. It is being delivered on time and within funding.

The new railway, which will be known as the Elizabeth line when services begin in 2018, will be fully integrated with London's existing transport network and will be operated by Transport for London. New state-of-the-art trains will carry an estimated 200 million passengers per year. The new service will speed up journey times, increase central London's rail capacity by 10% and bring an extra 1.5 million people to within 45 minutes of central London.

The new stations, public space and associated developments will add to the fabric of the landscape, act as a catalyst for regeneration and influence the way people experience the city and its suburbs.



## Crossrail's approach to design

In constructing ten new stations Crossrail has experienced varying engineering challenges and environmental considerations unique to a stations location. These parameters have defined the two main structural forms: mined underground and box-shaped underground stations, as well as above ground surface stations.

**In underground spaces, from station platforms to the top of the escalators, the architectural forms and materials will be recognisably consistent to give passengers a sense of familiarity right across the route.**

**As passengers move upwards, into the ticket halls and surrounding streetscape, each new station will have its own, distinct character that reflects the environment and heritage of the local area.**

The remainder of the Elizabeth line route includes 30 existing stations. Each of these outer London stations are being upgraded with some undergoing major design transformations.

The stations have been designed to create accessible, safe and comfortable spaces that people can move through easily and efficiently.

## Integrated design

For the first time in a major UK rail project, the stations, surrounding areas, and the oversite developments, have been designed at the same time. This integrated approach improves accessibility and comfort, and knits the new stations into their surroundings.



## Designed for growth

Multiple entrances and ticket halls, more space below ground and straightforward access to the rest of the transport network will ensure that Elizabeth line stations feel spacious, are easy to navigate and can cater for future growth in passenger numbers.

The platforms will be 250 metres long to accommodate the new 200 metre long train as well as longer rolling stock in the future.

## Sustainability

Social, economic and environmental impacts have been an important consideration throughout design and construction. Material from excavations has been beneficially reused; low-energy lighting will feature in stations and tunnels; and state-of-the-art lightweight energy efficient rolling stock will carry large numbers of passengers.

Bespoke BREEAM methodology helps ensure environmental performance of stations meets a minimum target of 'Very Good'.

### Seven principles have underpinned the design:

- **IDENTITY:** Deliver a consistent brand through a modern and contemporary transport mode, responsive to its local contexts.
- **CLARITY:** Create an understandable environment for passengers from the start to the end of their journey.
- **CONSISTENCY:** Implement a coherent line-wide design language, established through common materials and components within the Transport for London family.
- **INCLUSIVITY:** Ensure the Elizabeth line is for everyone.
- **SUSTAINABILITY:** A best practice design that minimises waste, maximises material qualities, reduces energy consumption and is cost efficient.
- **SECURITY:** Provide safe and secure design solutions.
- **PEOPLE FOCUSED:** Designed to balance functional and people needs.

## Platform level to escalators - consistency and familiarity

The five mined underground stations in central London - Bond Street, Tottenham Court Road, Farringdon, Liverpool Street and Whitechapel – set the foundations for architectural components designed as part of a line wide package.

The geometries defined by the tunnel engineering inside these stations are celebrated and become one of the most distinguishable features of these stations. The use of sprayed concrete lining has led to curved junctions and spaces that are larger in scale compared to existing London Underground assets. These bigger spaces, with separate exits at opposite ends of platforms into brand new ticket halls, will accommodate future passenger growth.

Glass-fibre reinforced concrete (GFRC) is used to clad the structural tunnel lining, leaving smooth, sweeping, curved edges that promote easy navigation and reduce blind spots for passengers. In each of the new underground stations, full height platform edge screens will provide lighting, wayfinding and service information while also separating passengers from the operating trains.

Consistent design, incorporating enhanced lighting and signage strategies, will clear the platforms and passageways of clutter and create a quality passenger experience as they move through the long platforms.

Many of the features synonymous with an underground railway - such as seating, wayfinding and signage systems, communications and fire safety equipment, handrails, screens, escalators and lifts – use a set of common parts that employ a clean design language and robust materials to create a consistent and familiar feel for the line. All of these consistent elements have been engineered to be tough and long-lasting.



## Prototyping – refining design every step of the way

Prototyping components for use on the project has been vital to refining and enhancing design as well as maximising efficiency - a rare opportunity for infrastructure projects, made possible by the scale of Crossrail.

The glass-fibre reinforced cladding used inside the new below ground stations is one example where prototyping has resulted in significant programme benefits. Through the prototyping and testing programme, the GFRC cladding and cladding grid has been optimised to achieve a lighter weight, cost-effective solution to the complex double curvature geometries.



## **Ticket halls to streetscape – reflecting local character**

As passengers make their way to the surface, through the ticket halls and into the urban realms outside the station, the local character and context will be woven into the architecture to give each site a distinct presence.

For example, the new Paddington station will echo the design legacy of Brunel's existing terminus building, while the new Farringdon station takes inspiration from the historic local trades of blacksmiths and goldsmiths, as well as the Brutalist architecture of the nearby Barbican.

## **Designs on outer stations**

On the outer sections of the route, 30 existing stations are being upgraded for Elizabeth line services. This stretch of the route is shared with National Rail, London Overground, TfL Rail and Underground services.

A major part of these works is the new urban realm designs that will knit the stations into their surroundings and enhance the overall experience and functionality of these public spaces for the people using them.

From east to west, many stations will see major improvement works. These include Acton Main Line, Ealing Broadway, Hayes & Harlington, Southall, West Ealing, West Drayton, Ilford and Romford.

All surface stations will have step-free access as part of a programme of upgrade works being undertaken by Transport for London and Network Rail.

## **The Culture Line – integrated works of art**

Permanent works of art will be installed into many of the new central London stations. Each new artwork will be fully integrated with the station, enhancing its design to create a line-wide exhibition that reflects London's newest railway and the communities it serves. With a potential audience of up to 200 million passenger journeys a year, this will make the Elizabeth line one of the UK's largest public galleries.

The Culture Line is entirely funded through private sponsorship, outside Crossrail's £14.8 billion funding envelope. The Crossrail Art Foundation is working with the project teams, City of London Corporation, world renowned galleries and corporate funders, to deliver new public artworks following a strategy developed in conjunction with FutureCity.

The first artist commissioned was the critically acclaimed Spencer Finch for Paddington station. 'A Cloud Index' is embedded into the station's 120 metre long glass canopy, and draws its inspiration from the big skies of the West Country, playing on the changing light and shadows throughout the day.



Other artists already announced include Turner Prize winning artists Douglas Gordon and Richard Wright who are producing artworks at Tottenham Court Road, and Michal Rovner who is producing a digital installation for Canary Wharf station. Successful artists for the remaining stations will be announced during the next year.

## Elizabeth line trains

The new accessible trains, designed by Transport for London, Barber and Osgerby and Bombardier, will be some of the most advanced trains on the UK rail system improving reliability, maintainability and efficiency.

At over 200 metres in length, they are significantly longer than existing London Underground trains, and can carry up to 1500 passengers.

The train design incorporates lightweight materials to improve performance such as aluminium for the body shell. Customer comfort features include intelligent lighting and temperature control systems.

The trains will use up to 30 per cent less energy than comparably sized trains, deliver faster journey times and regenerate electricity back into the power supply.

Large, clear areas around the doors will allow quicker and easier boarding and alighting. A mixture of metro-style and bay seating will be available throughout the train.

The interior design and colour palette have been carefully selected to provide an accessible and welcoming environment. The design includes darker floors and natural finish materials that will wear in ensuring they retain their high-quality feel for years to come. The light coloured ceilings also maximise the feeling of height and openness. The material and colour choices align with the Elizabeth line stations for a consistent customer experience.



## Architectural components – creating a familiar identity

- Design team | Atkins, Grimshaw, GIA Equation, Maynard
- Scope:
  - Tunnel cladding and flooring
  - Wayfinding, graphics and signage
  - Platform screen doors and platform edge screens
  - Lighting and integrated service booms
  - Balustrades and handrails
  - Technology components including CCTV

**Throughout the Elizabeth line there are common architectural components which provide a distinct and consistent identity. The components are comprised of a number of elements that guide passengers to where they need to be, and ensure travelling through the line is a comfortable and enjoyable experience.**

A multidisciplinary team of engineers, architects, industrial designers, lighting designers, wayfinding specialists and graphic designers are working to deliver the many components that underpin the identity of new the line.

The identity will be most apparent in the central stations, where the below ground tunnelled environments are similar and respond to a common set of requirements. As passengers make their way from the platform towards the station entrance, they move from these common environments through to the ticket halls where the design is unique to its local urban context.

Extending beyond the central stations, products like signage and seating are used throughout the Elizabeth line, and will provide a unified link through all new and renovated stations. Highly serviced components have been separated and grouped into easily maintainable 'technology elements' such as the platform edge screen, totems and escalators. These elements incorporate lighting, speakers, customer information, signage and communications equipment.

The cladding of the platform tunnels follows the geometries of the spayed concrete lining, and the use of glass fibre reinforced concrete (GRFC) makes it possible to provide a smooth, curved cladding system which showcases the engineering of the underground environments. This design approach also enhances the flow of passenger movement and reduces blind spots for passengers.

Tunnelled areas are kept clean and uncluttered to ease wayfinding with lighting that complements the passenger journey. There is indirect lighting in spaces where people wait or orientate themselves, and cooler direct lighting in transit spaces.

All materials in the architectural components from GRFC to glass and stainless steel are chosen for their durability and self-finish, with many designed as a kit-of-parts. Prototyping throughout the design stage, as part of a line wide approach, has been key in refining and enhancing the design of the components. Regular materials testing, early engagement with manufacturers and ergonomic user-group testing has ensured a high standard of products are delivered as part of the architectural components package.

## Paddington station – a modern take on a Victorian icon

- Station architect | Weston Williamson
- Engineer design | AECOM
- Main contractor | Costain Skanska JV
- Urban realm designers | Gillespies / URS / Weston Williamson
- Station structure | Box
- Excavated material | 315,000T
- Depth below ground | 20m

**Paddington station is undergoing the most significant transformation since the completion of the original building in 1853. Building on the design legacy of Isambard Kingdom Brunel and the architect Matthew Digby Wyatt, the new station is a contemporary take on the original vision.**

Built to the south of Brunel's iconic 19th Century station, directly below Eastbourne Terrace and Departures Road, the new station spans three levels with two entrances into the station via a new pedestrianised public realm. To ensure minimal impact on the Grade I listed station and other heritage buildings, a box-shaped underground structure was chosen.

A 90 metre clear opening - a unique feature for urban underground station design – will be covered by a dramatic steel and glass canopy eight metres above the ground that will let natural light flood down to the station platform. The open void will allow for natural air circulation through the station.

Printed onto the 120 metre long canopy will be a bespoke work of art by American artist Spencer Finch. The 'Cloud Index' will create a picture of the sky which will appear to change according to the light, the direction of the sun and the time of day in the tradition of artists such as Constable and Turner.

At street level, a stone-paved street with informal benches will be lined with shops and cafes on the station side creating a destination in itself. From there passengers can walk into the Main Line station or descend the escalators to the Elizabeth line.

As passengers descend into the station via lift or escalator, the station box is lined with flush-jointed brick, perforated in places for acoustic absorption. Other materials are equally durable: glass, bronze and anodised aluminium, plus the stainless steel of the common components such as the escalators.

At platform level a series of eight flared elliptical columns, clad in bronze to head height at their base, carry the weight of the structure and dark, anodised 'Lily pad' light fittings are embedded into concrete ceiling coffers.

The layout and structural elements have been set to the 10 foot imperial grid system to match Brunel's original Paddington station. Everything is scaled up or down from that module, which means that all the components of the new station make a coherent family of parts derived from Brunel's imperial measurements. Each element reflects the themes established by Digby Wyatt in the original station which, in turn, are based on Owen Jones' famous treatise *The Grammar of Ornament*.

## **Bond Street station – a modern classical approach**

- Station architect | John McAslan + Partners
- Engineer design | WSP
- Main contractor | Costain Skanska JV
- Urban realm designs | John McAslan + Partners / WPS / Publica
- Oversight development partners | Great Portland Estates (Hanover Square), Grosvenor Estates (Davies Street)
- Station structure | Mined
- Excavated material tonnage | 302,000T
- Depth below ground | 28m

**Historic buildings, art galleries and a vibrant retail precinct serving tourists, residents and businesses form the backdrop for the new Bond Street station designed by John McAslan + Partners. It will help improve accessibility and increase capacity at one of the busiest shopping districts in the UK to accommodate over 225,000 people using the Jubilee, Central and Elizabeth lines daily.**

Two brand new ticket halls at street level, flooded with natural light, will lead passengers to the platforms. Entrances bordered by colonnades – red sandstone and bronze for Davies Street, pale Portland stone for Hanover Square – blur the line between interior and exterior spaces creating a great sense of openness and civic presence. This is further reinforced by the high ceilings at each location. Above the escalators, bronze panels add decorative detail while providing acoustic absorption.

These colonnades, formed using structural and non-structural pre-cast concrete units, have been designed so that the station and commercial development above are seen as a single construction. Wide openings between columns lead to clear, legible entrances. The unused spaces between columns are filled with glazed window panels and ventilation grilles framed in bronze.

The beams of the coffered ceilings align with the lines of the columns which open out to the new public spaces. Exiting the eastern ticket hall, passengers are presented with a revamped green space – a result of the public realm transformation of Hanover Square led by Westminster City Council in collaboration with adjacent property owners and developers. New mixed-use buildings sit above both ticket halls, helping the new public buildings weave into the surrounding architecture.

## Tottenham Court Road station – striking contrasts

- Architect | Hawkins\Brown
- Engineer design | Arup / Atkins
- Main contractor | Laing O'Rourke
- Urban realm designs | Atkins / Gillespies / AHMM
- Oversight development partner | Derwent London (One Oxford Street)
- Station structure | Mined
- Depth below ground | 24m

**Located in the heart of the West End, Tottenham Court Road is undergoing a major transformation. The Crossrail project is delivering a new underground station and ticket hall at Dean Street in Soho and a second integrated ticket hall below St Giles Circus on Oxford Street, both designed by Hawkins\Brown.**

The integrated ticket hall, which will be six times the original size, is part of the Transport for London major upgrade at this site and includes new a public plaza and station entrances outside Centre Point.

When complete, Tottenham Court Road will be one of London's busiest stations, offering an interchange between Northern, Central and Elizabeth line services with more than 200,000 passenger journeys daily.

Above ground, a protected conservation area, heritage listed buildings, bustling retail, businesses and a new theatre frame the local station context. The new station has been designed to fit into a complex subterranean landscape.

The new Crossrail station at Tottenham Court Road stretches from a new plaza in front of Centrepoint westwards to Dean Street, running directly below Soho Square.

The western ticket hall in Soho is dark and cinematic, reflecting the nocturnal economies that characterise the area. At this site, black is the colour of choice for the glass and stainless steel inside the station.

In contrast, white glass and stainless steel dominate the colour palette at the eastern ticket hall - bright and well lit to reflect the 1960s iconography of Centre Point. Glazed elevations to the ticket halls together with the station lighting strategy create a glow, helping to reinforce their presence at night and provide a connection to natural light during the day. Intuitive wayfinding aided by light, art and curved surfaces will help guide passengers easily and comfortably to and from platforms.

Turner Prize winning artists will feature inside the station, adding to the already rich selection of work curated by Art on the Underground. An applied gold-leaf artwork by Richard Wright will form the ceiling of one of the eastern escalator boxes. At the western end, a sequence of screens descending into an escalator will display digital artworks by Douglas Gordon.

Below ground, distinctive 'drum' light fittings incorporate acoustic absorbers to keep down noise and echo. Intended to reference theatre-style lighting, the drums are set between the deep roof beams. A subtle variation in lighting intensity has been worked into the overall lighting design to aid passengers easily through the station.

## Farringdon station – celebrating craftsmanship

- Architect | Aedas
- Engineer design | AECOM
- Main contractor | Bam Ferrovial Kier JV
- Urban realm designs | Burns + Nice / URS
- Oversight development partner | Cardinal Lysander (Cardinal House)
- Station structure | Mined
- Excavated material | 332,000T
- Depth below ground | 25m

### **The goldsmiths, watchmakers, ironmongers and blacksmiths of Farringdon, Clerkenwell and Smithfields and the Brutalist architecture of the nearby Barbican Centre provide the context for the new Farringdon station designed by Aedas.**

The station will increase capacity and improve accessibility, acting as a catalyst for further economic growth. When complete, it is planned that over 140 trains per hour will flow through the Farringdon interchange when it becomes a link between Thameslink, London Underground services and the Elizabeth line.

Two new ticket halls are connected by underground mined platforms. The western end located on the corner of Farringdon Road and Cowcross Street will integrate with the Thameslink ticket hall.

The eastern end is bound by Charterhouse Street, Lindsey Street and Long Lane. This major transport interchange site has had to fit within a complex infrastructure network up to 25 metres below ground. The engineering and design challenges here have driven tailored design solutions such as lifts that move on a slope rather than the standard vertical movement.

In the eastern ticket hall, the soffit design references the Barbican centre and the design of heavy metal sliding-screen gates has been derived from a barcode for 'Farringdon'. In the western ticket hall the soffit and material selection draws influence from the nearby diamond and jewellery quarter.

A material palette comprising champagne coloured stainless steel cladding and etched glass panels unify design at both ticket halls.

Urban realm designs around the station maximise pedestrian capacity to meet predicted passenger demands. A pedestrian priority plaza is created between the Elizabeth line and Underground ticket halls at the western end of Cowcross Street. The improved public space around each station places priority on pedestrian flow and includes new trees, seating and widened footways.

The diamond pattern work of the soffit and cassettes draws on the jewels sold nearby.

The geometric offset of the apse in the western ticket hall acknowledges the geological fault and old River Fleet which are immediately below this area.

## Liverpool Street station – maximising space and light

- Architect | Wilkinson Eyre
- Engineer design | Mott MacDonald
- Main contractor | Laing O'Rourke
- Urban realm designs | Burns + Nice / URS
- Oversight development partner | Aviva Investors
- Station structure | Mined
- Excavated material | 567,000T
- Depth below ground | 34m

**Nestled in one of the City's leading financial centres, surrounded by a continually evolving dense urban landscape, Wilkinson Eyre's design for Liverpool Street station makes the most of what little space is available to build a massive piece of infrastructure.**

Stretching from Moorgate in the west to Broadgate in the east, the Elizabeth line ticket halls are connected by two platforms. Fully accessible ticket halls provide direct interchange with the Northern, Central, Metropolitan, Circle and Hammersmith & City lines, as well as National Rail services to Stansted and Southend airports.

A number of physical constraints below ground at Liverpool Street made the station one of the trickiest to thread into the urban fabric, including a maze of sewers, existing Tube lines and the Post Office Railway. In addition, layers of the city's history had to be revealed before much of the work could get underway, which in total uncovered nearly 4,000 skeletons from the Bedlam burial site as well as thousands of artefacts dating back to Roman times.

A unified architectural design inside the ticket halls is driven by the desire to maximise height in these constrained spaces. A shallow, geometric folded ceiling plane formed by ribbed pre-cast concrete soffit panels breaks perception of the low flat ceilings to create a greater sense of space, scale and movement. The grooved, angled ceilings could be seen to resemble the pinstripes, often seen in the suits of City workers. A subtle sparkle of mica in the fibre-reinforced white concrete will glow with indirect lighting. Direct lines of sight to vertical circulation such as the escalators aid smooth passenger journeys.

The entrance into the underground eastern ticket hall is through a striking, five metre high glazed canopy located in an open pedestrian plaza. Natural light filters below ground during the day, while at night the canopy acts as a lantern with artificial lighting from inside shining out of the glazed entrance to illuminate the streetscape. The western ticket hall is at street level and accessed through an angular portal entrance, framed by bold blue coloured glass. Glass panels and acoustic panels made from perforated vitreous enamel steel have been used on walls, while terrazzo is used for the floors.

New forecourts and plazas around each entrance create pedestrian friendly, accessible spaces with wider pavements. This will allow people to gather and dwell whilst maintaining clear pedestrian flows in and out of the station.

## Whitechapel station – connecting communities

- Architect | BDP
- Engineer design | Arcadis
- Main contractor | BBMV JV
- Urban realm designs | BDP / Arcadis
- Station structure | Mined
- Excavated material | 451,000T
- Depth below ground | 30m

**Located in a rich and culturally diverse area, Whitechapel station is an important interchange for both the Hammersmith & City and District lines and London Overground. BDP's design approach here will see the new Elizabeth line station weave between the existing transport services to an elevated station concourse which acts as a bridge improving community links.**

Access to all interchange services will be from a spacious, new ticket hall sitting on a bridge above the Victorian railway infrastructure. Entry to the station will be through the refurbished original entrance on Whitechapel High Street. To improve connectivity to the surrounding area a new second entrance is provided at the northern end of the station.

The new station concourse sweeps from the High Street over the East-West Underground lines and above the north-south Overground lines before dipping under the road bridge at Durward Street. It continues along the course of the railway cutting where it then allows access to the new platforms. The architectural design ensures good connections and visibility for all the interchange services within the station.

The raised concourse perches on steel struts, resting on the brick arches of the Overground cutting. It floats in the space, allowing daylight down to the Overground platforms. Its 'green roof, topped with sedum plants, dips down under a new bridge connecting it to Durward Street, provides several environmental benefits including improvements to air quality, noise and storm water attenuation, conservation and biodiversity.

Natural light and fresh air from the station concourse creates a calm, open, brightly-lit environment. A new public square at the northern end of the station provides a new pedestrian link to Whitechapel High Street.

Natural materials complement the approach to daylight and the use of the existing railway heritage.

Escalators down to the Elizabeth line platform at the northern end are placed in a diagonal slice through the western vent shaft building. All this is mostly hidden from view externally, behind the existing refurbished modest Victorian station frontage on the High Street, where a widened stone-paved footway makes a forecourt, with a new concourse behind it.

The wider urban setting is well served as part of an overall masterplan to improve the area. A public footway runs right through the station from end to end, separate from the concourse. This reconnects people north of the station with the High Street. Also to the north, a landscaped public square will replace what is at present a surface car park.

To the west, Court Street, leading to a pedestrian bridge over the Underground tracks, will be made vehicle-free, better paved and lit to be more welcoming. To the south, the widened pavement on Whitechapel Road acquires something of a boulevard feel, linking across to the former Whitechapel Hospital, now to be council offices with a new square behind.

## Canary Wharf station – a vibrant urban destination

- Client | Canary Wharf Contractors Limited
- Station concept architect | Tony Meadows Associates
- Executive architect | Adamson Associates
- Oversight development architect | Foster and Partners
- Engineer and lead consultant | Arup
- Urban realm design | Gillespies
- Station structure | Box
- Depth below ground | 28m

**Sitting below a five storey mixed-use development known as Crossrail Place, the new Canary Wharf station helps connect this key business district to the City of London, the West End and Heathrow. At the same time, it acts as a bridge between two communities: Canary Wharf Estate and Poplar to the north.**

From 2018, the station will become a key interchange hub for commuters transferring between the Elizabeth and Jubilee lines and the DLR.

The 256 metre-long station box sits directly below five levels of mixed-use development and is surrounded by the water of West India Quay dock. Designing a station to be built 18 metres below water level presented significant design challenges but has resulted in optimum access to and through the Canary Wharf Estate while retaining a navigable channel for boats within the dock.

The station ticket hall is accessed via eight long-rise escalators from the promenade level entrances at either end of the building. A visual connection between the station platforms and the concourse level above is achieved through the use of large openings between the two floors and a central spine of vertical circulation reinforced by the use of colour and light. More than one hundred thousand square feet of retail and leisure space sits above the station.

A 310 metre-long timber glulam roof, sheltering a striking roof-top garden, lets in light and rain for natural irrigation. Translucent air filled pillows (ethylene tetrafluoroethylene) allow direct views in and out of the building. Sustainably sourced beams provide a warm, natural counterpoint to the glass and steel towers of Canary Wharf.

The nautical reference extends beyond the main structure of the building to the angled design of the buttress ends, anchoring the striking timber lattice roof.

## Woolwich station – drawing on history

- Clients | Crossrail, Berkeley Homes
- Architect | Weston Williamson
- Engineer design | Arup
- Main contractor (station fit-out) | Balfour Beatty
- Urban realm designs | Gillespies / Atkins
- Station structure | Box
- Depth below ground | 14m

**The historic site of the Royal Arsenal, Woolwich was once a walled off private world that saw the manufacture of guns and explosives, munitions testing, a military academy and the production of medals and other civilian goods.**

Today, the new station designed by Weston Williamson is a key part of a new masterplan on the Royal Arsenal site which includes 3,750 new homes and new cultural, heritage, commercial and leisure quarters.

A 276 metre-long box station sits below a major housing development site. The minimalist, straightforward design provides entry into the station from a single 30 metre wide bronze clad portal. Natural light enters through the main entrance and ceiling into the ticket hall. A connection to daylight is present below ground on the platforms.

Set back from the main street and surrounded by a series of heritage listed buildings and a large retail unit, the station acts as a simple portal connecting all these elements together.

The station entrance opens out on to Dial Arch Square, a green space, flanked with a series of Grade I and II listed buildings.

In addition to enhancing the experience in and out of the station, the urban realm design also helps connect the station with the wider town centre.

## Custom House station – linking it all together

- Architect | Allies and Morrison
- Engineer design | Atkins
- Main contractor | Laing O'Rourke
- Urban realm designs | Ramboll
- Station structure | Above ground

**The site at Custom House, constrained by the existing DLR line and power cables passing overhead, residential properties to the north and ExCel London to the south, required a unique solution. The station design by Allies and Morrison creates a distinct presence and welcoming civic building for local people, regional and international visitors.**

It was crucial that the station integrated well within the existing infrastructure and wider urban surroundings. To achieve this, a freestanding building with an elevated concourse above it was designed using pre-cast concrete.

The long station façade that lines Victoria Dock Road is reminiscent of a classical temple. The station plan is a simple, straightforward journey from the station entrance to the train doors. Access to the Elizabeth line platforms is via lifts, stairs and escalators from a spacious upper concourse.

The 18-degree angle between Victoria Dock Road and Freemasons Road which join at the southern end of the station sets the structural layout for the building. This geometry is expressed in the design from the paving to ceiling details, giving the building a sense of energy and movement and helping integrate it into its environment.

The solidity of the smooth, pale concrete building frame is offset by a delicate canopy above the concourse. A slender, steel-framed grid containing ethylene tetrafluoroethylene (ETFE) pillows is used on the roof to provide shelter and allows natural light to filter into the station.

Urban realm enhancements include a new landscaped area with planting, cycle parking, wayfinding and improved lighting.

## Abbey Wood – a catalyst for regeneration

- Client | Crossrail, Network Rail
- Architect | Fereday Pollard
- Engineer design | Tony Gee and Partners, WSP - Parsons Brinckerhoff
- Main contractor | Balfour Beatty Rail
- Urban realm designs | Urban Movement
- Station structure | Above ground

**The Crossrail project will arguably be more transformational at Abbey Wood than anywhere else along the route. The Elizabeth line will halve journey times to many central London destinations and add 12 trains an hour to the services already provided by the operator Southeastern.**

Two areas of transport infrastructure currently dominate the local environment and obstruct local pedestrian movements: the railway line and the Harrow Manor Way flyover. Together the new Crossrail station and the urban realm improvements will lead to significant improvements in the local area.

A new station is being built to replace the former structure that was too small to accommodate larger passenger numbers and the two new Crossrail tracks required to link the station with the new tunnels at Plumstead to the west.

Key to the design is to integrate the new building with the elevated flyover, Harrow Manor Way. The station building is then set back and built over the railway tracks where the two new Crossrail lines come in and terminate while the existing Southeastern lines continue on through.

This allows for a proper, granite-paved pedestrian concourse. From here the station building is shaped both to swoop down to platform level below, but also to link radically transformed civic spaces to either side at ground level.

From above, the station is shaped like a manta ray, its zinc-surfaced 'wings' extending into canopies sheltering impressively-scaled staircases either side. Lifts emerge as architectural features flanking the station forecourt. The building with its ticket hall and shops makes great use of wood: framed inside with laminated larch beams, and clad on its flanks with a sustainable and durable hardwood, above a warm brick base. Glazed canopies run back along the platforms, with an escalator-equipped overbridge halfway down to allow access when changing trains.

## Outer stations – transformations and upgrades

Across the east and west, many stations will see major improvement works. These include Acton Main Line, Ealing Broadway, Hayes & Harlington, Southall, West Ealing, West Drayton, Ilford and Romford.

All surface stations will have step-free access as part of a programme of upgrade works being undertaken by Transport for London and Network Rail.

### Ealing Broadway station

- Architect | Bennetts Associates
- Station structure | Above ground

The transformation here will see an accessible new station that includes a ticket hall that is twice the size of the current one with a long, curved canopy running the length of the forecourt. A dated facade will be replaced with a new glass structure and a bigger entrance will give the building a much larger, brighter feel.



### Hayes & Harlington

- Architect | Bennetts Associates
- Station structure | Above ground

The station upgrade is delivering a new, bright, spacious ticket hall and a new footbridge with four lifts to provide step-free access to every platform. A new triangular piazza planted with trees allows for new bike lanes and bike parking.

